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THE FEATURES AND INSTABILITIES OF PLASMA MICROSTRUCTURES OCCURING AT AN EARLY STAGE OF AIR DISCHARGE FORMATION NEAR THE SURFACE OF THE POINT ELECTRODE.

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When registering an object by interferometry, the phase raid of the probing radiation is restored both in the frame with the object under study, in our case an air discharge, and in a similar frame without an object, in our case the electrode interval before the discharge occurs. The difference between the two-dimensional phase raid maps with and without the object forms a phase raid map on the object under study. For the most significant one-dimensional slices of the obtained map, using the inverse Abel equation, the density of the object is restored, assuming the symmetry of the one-dimensional slice. In order to improve the accuracy of determining the phase raid in the frame, regardless of the distance from the lines of intensity extremes, the processing of the original frame was carried out in accordance with the algorithm until the unambiguous correspondence of the brightness of each point of the frame to the phase raid in it was established [1].

In the electrode gap, 1-3 ns after the beginning of the development of the discharge in the near-cathode region, a phase object of spherical geometry is registered, with a center on the surface of the electrode (the center of the sphere coincides with the border of the shadow of the cathode tip with an accuracy of 3 μm) and a radius of 35-60 μm. The surface of the sphere is formed by a constant phase line. Perpendicular to the spherical surface, as a rule, 1-3 filaments with a diameter of 15-30 μm develop, further propagating in the direction of the anode. The application of the inverse Abel transformation to the phase raid slices on the sphere and filaments shows that these objects coincide in density in the adjoining zones with an accuracy of 25% and are 1-3e19 cm-3. These data lead us to the assumption that at the initial stage of the development of the discharge, cathode emission occurs, forming a spherical expanding plasma object, from the surface of which, due to instabilities, dense plasma filaments develop.

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REFERENCES

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